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**Electronic Methods of Collecting Survey Data:
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ELECTRONIC METHODS OF COLLECTING SURVEY DATA: A REVIEW OF 'E-RESEARCH'

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ELECTRONIC METHODS OF COLLECTING SURVEY DATA: A REVIEW OF 'E-RESEARCH'

Electronic data collection can take on many forms ranging from computer-administered surveys to internet surveys. While the benefits to collecting data electronically are many, obstacles also exist. This paper reviews three major methods of collecting survey data electronically: computer administered surveys, electronic mail surveys, and web surveys. The literature on these methods is reviewed, and the benefits and obstacles of each method are highlighted.

Computer Administered Surveys

Computer administered surveys represented the real first use of computers in collecting survey data. When using a computer administered survey, a program is written to administer the questions and to collect the answer as it is chosen by the respondent. The survey may be administered in several ways: 1) by gathering a group of people in a central location to answer the questions at the computer; 2) the survey may be installed on the organization's network; or 3) the program may be saved on disk so that each individual can just open a survey on their desktop and then return the disk when they are done. Existing literature citing the use of computer administered surveys reports the gathering of respondents in a central location as the primary method (Booth-Kewley, Rosenfeld, and Edwards, 1993; Kiesler and Sproull, 1986).

Much of the literature on computer administered surveys compared the data quality and existence of socially desirable responding of computer administered versions of surveys to their paper and pencil counterparts (e.g., Booth-Kewley, Rosenfeld, and Edwards, 1993; Kiesler and Sproull, 1986; Rosenfeld, Booth-Kewley, and Edwards, 1996; Booth-Kewley, Rosenfeld, and Edwards, 1992; Beebe, Mika, Harrison, Anderson, and Fulkerson, 1997). Overall, the computer administered survey shows comparable results to the traditional paper and pencil survey (Booth-Kewley, et al., 1992; Booth-Kewley, et al., 1993; Edwards, Rosenfeld, Booth-Kewley, and Thomas, 1999; Rosenfeld, et. al., 1996), with a few nuances. For example, Kiesler and Sproull (1986) found that closed end responses in the electronic survey were less socially desirable and tended to be more extreme than were responses in the paper survey. Further, open ended responses were relatively long and disclosing as compared to answers in the equivalent paper and pencil survey. Skinner and Allen (1983) compared the effect of computer administered surveys, face to face administration, and self-

administered paper and pencil surveys on an individual's accurate expression of sensitive information. While they hypothesized that individuals would provide more accurate information about sensitive issues to a computer than to a person or by self-report on a paper questionnaire, no differences were found with regard to the three methods. While computer administration did not increase accurate response, respondents rated the computer as less friendly, faster, more relaxing, lighter, and more interesting than the other two methods. Skinner and Allen (1983) also noted that better educated individuals and defensive clients did not like using the computer for the survey.

Martin and Nagao (1989), using a student sample in a simulated job interviewing environment, compared four methods of survey administration for different effects on socially desirable responding, liking, anger, and resentment: computer interview, paper and pencil questionnaire, face to face interview with a 'cold' interviewer, and face to face interview with a 'warm' interviewer. In addition, the research examined for effects between high status or low status positions. Nonsocial methods (both paper and computer) subjects scored lower on social desirability. However, those interviewing for highstatus jobs resented being interviewed in a nonsocial manner. No differences were present between 'warm' or 'cold' face to face interviews.

Booth-Kewley, et al. (1992) investigated the existence of impression management, social desirability, and computer administration of attitude questionnaires. They concluded that paper and pencil and computer questionnaires have the same results. Though, as expected, non-anonymous respondents did show socially desirable responding. Rosenfeld, Doherty, Vicino, Kantor, and Greaves (1988) compared three types of computer administered surveys for levels of user satisfaction, but found no differences. More recently, Rosenfeld, et al., (1996) compared computer administered surveys that are confidential to nonconfidential computer administered surveys to equivalent versions of paper and pencil tests. The research investigated the presence of socially desirable responses and fear levels for the different treatments. Socially desirable responding and high levels of fear were present in both nonconfidential surveys (computer administered and paper and pencil versions).

Beebe, et. al., (1997) noted that while computers are frequently used in telephone interviewing (CATI systems) and that computer administered questionnaires have been used in a business context, their research is the first to evaluate the use of computer

administered questionnaires in a school setting. They compared equivalent paper and pencil questionnaire formats to computer administered formats in schools. They concluded that the computer administered format was successful and highlighted the design of their computer program in detail, including the inclusion of scrolling, jump screens, quit options, no automatic next, no keyboard responses (mouse use only), help screens, and a progress thermometer so that subjects could estimate time left.

Benefits to computer administered surveys include 1) lowered levels of social desirability responding; 2) respondents perceive the survey has shorter and more enjoyable; 3) data entry is eliminated; and 4) complex branching and prompting of questions can be used. Kiesler and Sproull (1986) and Erdman, Klein, and Griest (1983) found that computer administered surveys showed fewer mistakes, fewer blank items, and fewer item refusals than paper surveys. Further, Kiesler and Sproull (1986) noted that computer administered surveys decrease processing costs while still allowing standardization and anonymity.

However, the literature has also noted the following drawbacks: 1) it can be expensive for small numbers of people (Rosenfeld, 1993); 2) the software might not work or be incompatible in different systems (Beebe, et al., 1997); 3) production workers may not be as comfortable with computers as office workers (Rosenfeld, 1993); 4) people want a way to know how much time is left (Beebe, et al., 1997); and 5) some individuals may resent being surveyed in a nonsocial manner (Martin and Nagao, 1989; Skinner and Allen, 1983). Computer administered surveys are most appropriate for organizational settings that allow for 1) a group of people to gather in a central location to answer the questions, or 2) a compatible network of computers to administer the questionnaire.

Electronic Mail Surveys

In using electronic mail surveys, a survey is sent to a person's email address. Individuals can then read, scroll down the message, answer the questions and then simply 'reply' or send the survey back to the researcher. Individuals that do not want to answer on line may also print the survey out and then answer it like a paper questionnaire and mail or fax it back to the researcher. Undoubtedly, both the sending of and responding to electronic mail surveys are among the simplest tasks in survey administration.

Overall, literature indicates positive experiences with email surveys, as well as high response rates for surveys distributed via electronic mail (e.g., Parker, 1992; Anderson and Gansneder, 1995). For example, Parker (1992) described her design of an email survey at AT&T. The electronic mail survey met several objectives for AT&T including an adequate response rate, a tight deadline, the need to reach people conveniently in multiple time zones, and a budget. While she described the obvious benefits of electronic mail surveys, she rightly noted the possible short-lived success of the electronic mail survey as people become increasingly comfortable deleting mail. In addition, Parker (1992) noted that many electronic mail surveys suffer from system compatibility issues.

Anderson and Gansneder (1995) mailed a 72-item email questionnaire with a response rate of 68%. Those responding to the survey tended to be comfortable with computers and experienced users of e-mail. Rosa (1996) indicated evidence of an increasing use of electronic mail surveys in a report that Decisive technology plans to launch an email based survey program to sell to companies.

Electronic mail does offer many notable benefits: 1) it is easy to send; 2) easy to reply, 3) low in cost compared to mail or phone or in person; 4) offers speed of response - responses can begin immediately; and 5) eliminates time zone hassles for individuals in different geographic areas (Parker, 1992; Mehta and Sivada, 1995). At the same time, many drawbacks exist. First, data entry is still required; thus disregarding one of the key benefits of electronic data collection in general. Second, systems used by different email users must be compatible for an email form to function correctly. Third, many people do not have email, may prefer not to use it, or may be unfamiliar with some of the more advanced functions that may be necessary in answering a questionnaire on line. Individuals may delete email that fails to interest them. As email becomes an increasingly mainstream form of communication, the deletion of email may become, to electronic mail surveys, the equivalent of the answering machine to telephone surveys. Questionnaire length is an issue for two reasons: 1) many electronic mail programs allow only a certain number of lines in a message, and 2) preliminary evidence suggests that individuals will not answer lengthy questionnaires via electronic mail.

Respondents may also disregard questionnaire design. Tom Miller of Find/SVP stated that with regard to email, respondents will rewrite questions, delete questions, and extend scales (Krasilovsky, 1996).

Another mark against electronically mailed surveys is that electronic mail addresses cannot be 'dialed' randomly like telephone numbers. There is no standard length or format for electronic mail addresses; thus, a researcher must have access to the sample's email addresses. Finally, net etiquette ('netiquette') frowns upon mass electronic mailings. A relationship to the group of individuals with electronic mail addresses under investigation is advisable (Schonland and Williams, 1996; Batinic and Bosnjak, 1996).

Web surveys

Web surveys represent a growing segment of web sites. Sites such as Nua Internet Surveys (www.nua.ie/surveys), with direct links to companies doing research on the web, and the APS (American Psychological Society) site (www.psych.hanover.edu/APS), with links to all known web projects in psychology, indicate a strong affinity to web research. Despite the significant drawback of sample bias, web surveys are a hot item. Williamson (1997) reported that Matchlogic - a startup ad management company is about to launch a massive internet survey with the goal of getting at least 1 million consumers to fill out surveys by the end of 1997.

Schonland and Williams (1996) described a research project utilizing a web survey of travelers. While Schonland and Williams (1996) openly discussed the significant drawback of sample bias and an unknown population in using web surveys, respondents to their survey were similar to general descriptions of travelers. Thus, in their specific situation, sample bias did not represent a negative factor. Many resources for developing web surveys (e.g., Batinic and Bosnjak, 1996) cite the need to provide incentives to potential respondents, but Schonland and Williams (1996) reported mixed results with regard to incentives. Their study utilized company sponsorships of incentives. Company sponsors received in exchange a banner promoting their role in the survey. While response appears strong (17,700 responses in the first 12 months), respondents showed a bias towards sponsors in answering survey questions.

The value of researching on the web comes in many forms. Davis (1997) identified some of the benefits of web research as 1) inexpensive as compared to other traditional survey methods, 2) response speed, 3) overall effectiveness, and 4) its visual

appeal. Cleland (1996) reported that on-line research costs about half that of traditional methods, and went on to predict that the internet will replace telephone and mail surveys as the primary medium for conducting research. Batinic and Bosnjak (1996) found that the majority of responses to web surveys generally occur within 2-3 days of posting the site. After the first week, responses decrease significantly. Batinic and Bosnjak (1996) also found evidence to suggest that people responding to web surveys tend to answer surveys at work, primarily in the afternoon hours. While many firms have adopted the web as a primary tool for conducting market research, it is unlikely that web research will become widely accepted for scientific communities in the short term.

Web survey research still poses many challenges to researchers. First, the population of individuals with access to the web is small as compared to those with mail addresses and telephones. In addition, the population is also largely an unknown. GVU's WWW User Surveys (www.cc.gatech.edu/gvu) described the following average characteristics of the web user. Web users are 70% male and 30% female. Fifty-six percent of web users hold a college or advanced degree. Eighty-three percent of the users are in the US. The average age is 35 and the average income is just above \$60,000. This is consistent with the picture painted by others of young, educated, male, wealthy users (Schonland and Williams, 1996; Davis, 1997). The Internet Domain Survey (www.nw.com/zone/www/top.html) estimated the number of hosts on the internet at 16,146,000 as of January 1997. Because no 'phonebook' of all internet users exists and many hosts have multiple users, it is difficult indeed to identify the true picture.

Related to this problem is the fact that respondents cannot be contacted. Rather, a web user contacts the researcher's web site. Thus, there is no way to track non-respondents and no way to control the quality of the sample of respondents participating in the survey. Krasilovsky (1996) suggested that internet research should be limited to pre-arranged panels so that people are represented properly. Further, Schonland and Williams (1996) identified another major challenge for all web researchers: keeping a respondent's attention when another surprise is just a keystroke away. Thus, getting respondents to the web site and keeping them there long enough to complete a survey is a major hurdle. Davis (1997) stated that banners located on frequently visited sites and the use of incentives have been successful in attracting and retaining respondents.

Even then, web research does not lend itself to long, complex surveys (Davis, 1997; Krasilovsky, 1996). Find/SVP found that respondents tend to lose interest after

25-30 questions and then quit the survey (Krasilovsky, 1996). On-line respondents typically will answer only one wave of questions. Tom Miller, Vice-President of Find/SVP stated that on-line interviews gather less than 10 % of the information that can be gathered in a telephone interview. Miller concluded that 'on-line research should only be used in conjunction with phone and mail surveys' (Krasilovsky, 1996: 19).

Conclusions

While there are many benefits available by using electronic data collection methods, many challenges also face the 'e-researcher'. First, will electronic survey methods be weakened by the proliferation of contacts on potential respondents. In other words, telephone interviews once offered high response rates (Frey, 1976; Dillman, 1978). However, with callerIDs and answering machines, it is increasingly less likely to reach targeted respondents (Tuckel and O'Neill, 1995). Similarly, individuals are inundated with mail pieces that lower the likelihood of noticing and responding to a mailed survey. The same challenge applies for electronic data collection methods. Electronic junk mail is showing up in electronic mail boxes everywhere.

Web surveys are increasingly common as firms and individuals realize the ease of use and quick response available. Yet, how can we differentiate one survey from another in gaining our targets' attention? Even then, what is the best approach in solving the sample bias presently inescapable in the web survey. Pre-screened panels offer one solution, as does time as more and more people gain internet access.

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